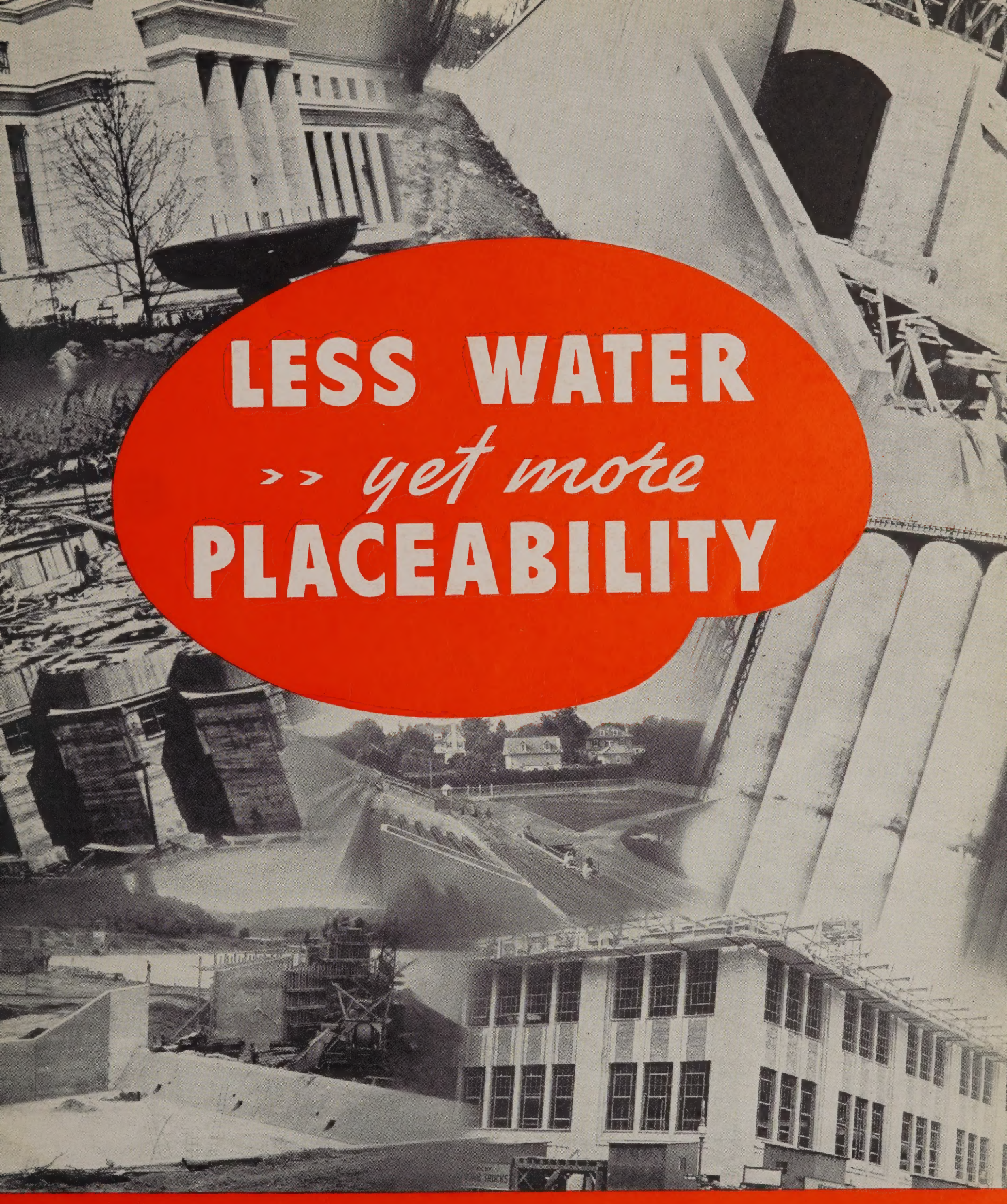


MASTER BUILDERS

THE MASTER BUILDERS CO.

GENERAL OFFICES AND MAIN PLANT, CLEVELAND, OHIO
Offices in all Principal Cities

IN CANADA . . . THE MASTER BUILDERS CO., LTD.
Toronto, Ontario

LESS WATER >> *yet more* PLACEABILITY

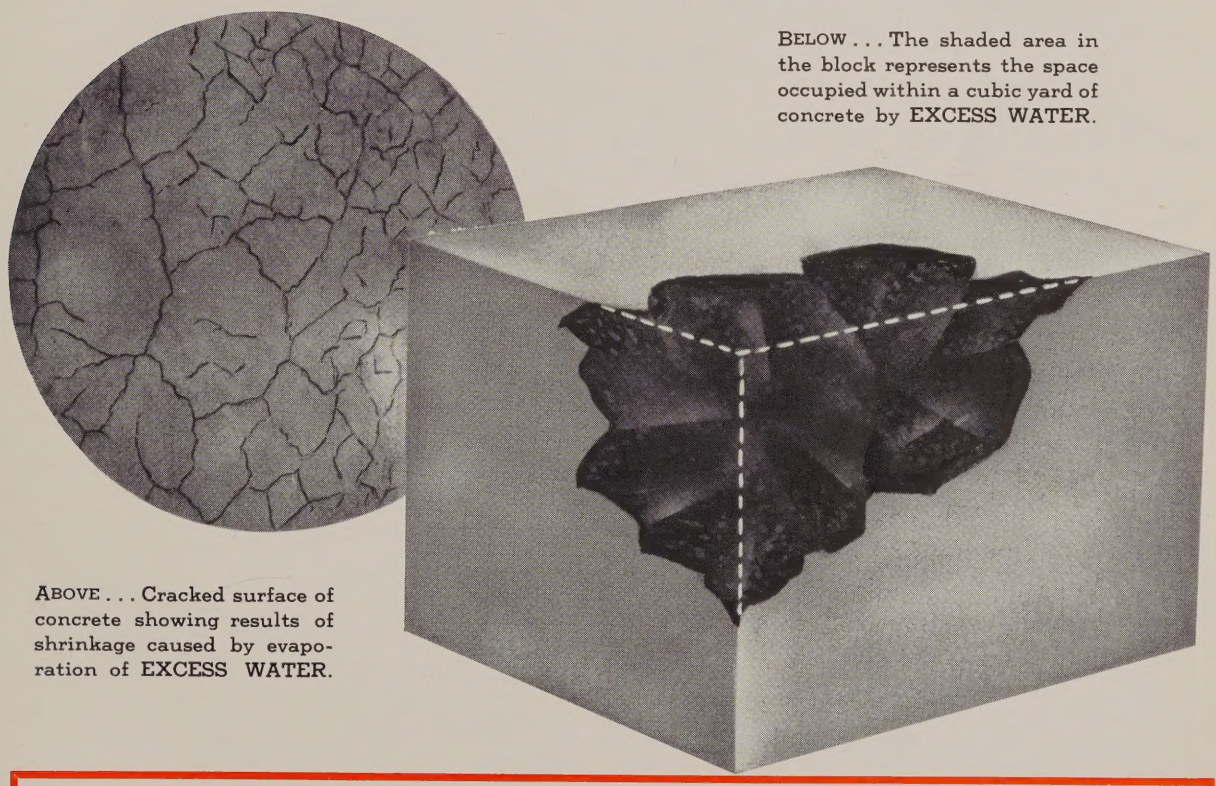
The result is

Better Concrete.

SINCE the introduction of the water-cement ratio law governing the strength and durability of concrete, the necessity for using comparatively "dry" mixes has been generally recognized. Of great importance, however, has been the need for some means of obtaining a low water-cement ratio mix that could be easily and economically placed. **Pozzolith** automatically accomplishes a sharp reduction in total water, but paradoxically provides a sharp increase in placeability in all practical concrete mixes.

WHY LESS WATER?

IN a cubic yard of concrete, approximately two and one-half gallons of water per sack of cement are required to completely hydrate the cement. Any water in excess of that amount must be regarded as "placing" water, merely providing sufficient workability to make the use of the mix economical. This excess or "placing" water occupies about 10% of the total space in concrete of average design. The illustration below startlingly portrays what would result if this space could be concentrated in a single area instead of occupying the same space throughout the mass in the form of voids, pores and shrinkage cracks. Obviously, as the volume of excess or "placing" water is reduced, the strength, density and durability of the concrete are improved.



BELOW . . . The shaded area in the block represents the space occupied within a cubic yard of concrete by EXCESS WATER.

ABOVE . . . Cracked surface of concrete showing results of shrinkage caused by evaporation of EXCESS WATER.

EXAMPLE

A 6-bag mix . . . . . using 6.5 gals. per bag = 39 gals. total water per cu. yd.

A 6-bag mix . . . . uses 2.5 gals. per bag (for hydration) = 15 gals. water per cu. yd.

A 6-bag mix . . . . . has 4.0 gals. per bag "placing water" = 24 gals. excess water per cu. yd.

Thus, as 7.5 gals. = 1 cu. ft., 24 gals. excess water means that 3.2 cubic feet of the total space are occupied by excess water in one cu. yd. of concrete.

KANSAS CITY LEVEE ELEVATOR

"The use of Pozzolith in the concrete work for the Kansas City, Kansas, Levee Elevator has produced the results contemplated at the time this material was specified. The addition of Pozzolith has maintained the desired slump with a reduced amount of water and has given a concrete easy to place with the minimum of labor.

"Due to the location of this elevator on a water saturated river bottom site, it is imperative that all sub-grade work be entirely waterproof. We feel this has been accomplished because the use of Pozzolith has produced a concrete of extreme density—"

HORNER & WYATT, Engineers, Kansas City, Missouri, W. F. SCHULTZ, Consulting Engineer, Memphis, Tenn., THE NICHOLSON CO., INC., Contractors, New York.

LESS WATER — YET MORE PLACEABILITY

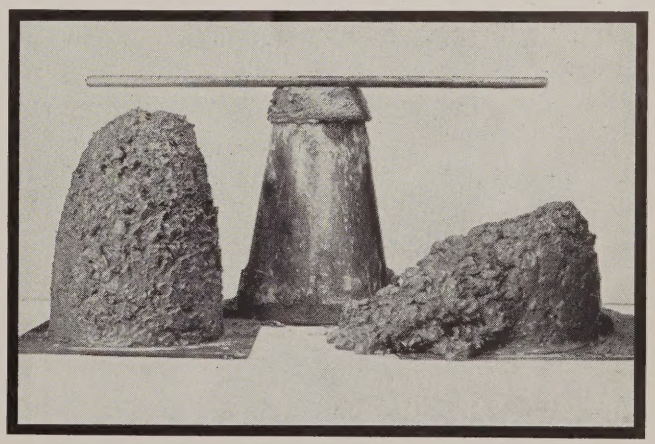
A MORE PLACEABLE MIX with **much less water** — possible because **Pozzolith**, while it reduces the excess water by as much as 33%, actually improves the placeability of the mix. In addition to providing decidedly greater slump, Pozzolith imparts to the mix a cohesive quality that removes many of the difficulties encountered in placing ordinary mixes.

"Our conclusion at this date in regard to Pozzolith is that it definitely increases the fluidity of concrete, which means improved placeability of concrete, or at equal workability it makes possible reduction in water-cement ratio and resultant improvements in qualities dependent on this ratio, such as strength and durability."

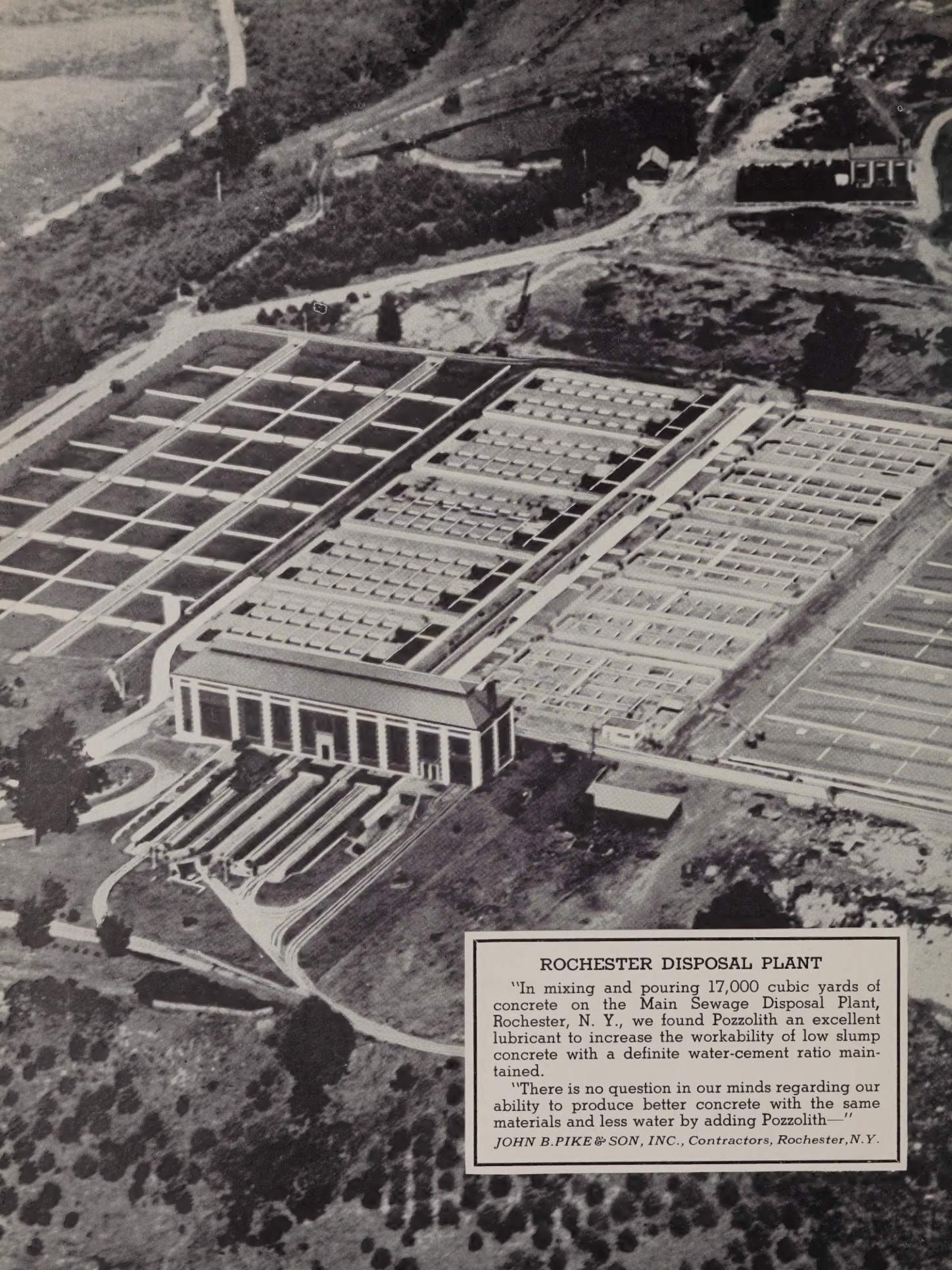
From report of tests by The Thompson & Lichtner Co., Inc., Engrs.
Miles N. Clair, Vice President.

PLAIN MIX		POZZOLITH MIX
2¼ gals.	Water	1⅞ gals.*
1¾ in.	Slump	2½ in.
3180 lbs.	Comp. Strength (7 days)	**5150 lbs.**

**16½% less water!*



PLAIN MIX		POZZOLITH MIX
2¼ gals.	Water	2¼ gals.
1¾ in.	Slump	6½ in.
3180 lbs.	Comp. Strength (7 days)	**4230 lbs.**



ROCHESTER DISPOSAL PLANT

"In mixing and pouring 17,000 cubic yards of concrete on the Main Sewage Disposal Plant, Rochester, N. Y., we found Pozzolith an excellent lubricant to increase the workability of low slump concrete with a definite water-cement ratio maintained.

"There is no question in our minds regarding our ability to produce better concrete with the same materials and less water by adding Pozzolith—"

JOHN B. PIKE & SON, INC., Contractors, Rochester, N.Y.

LESS WATER — LESS VOLUME CHANGE

THAT a reduction in the water-cement ratio reduces volume change, i. e., shrinkage, both during hardening and subsequently, is acknowledged by engineers. Professor Inge Lyse of Lehigh states that ". . this accounts for the fact that . . . lean mixes shrink less than rich mixes . . . and **dry mixes less than wet mixes . . .**" Engineer M. Hirschtal, Chief Engr. D. L. and W. R. R., expresses another viewpoint when he says ". . . . almost invariably the cement or aggregate is blamed for deteriorating concrete . . . whereas the . . . chief offense is failure of proper curing coupled with **too much mixing water during installation . . .**"

SHRINKAGE TEST

Cement 400 g.
Sand 1200 g.
} 2" x 4" cylinders
at equal consistency

SHRINKAGE AT 24 HRS.

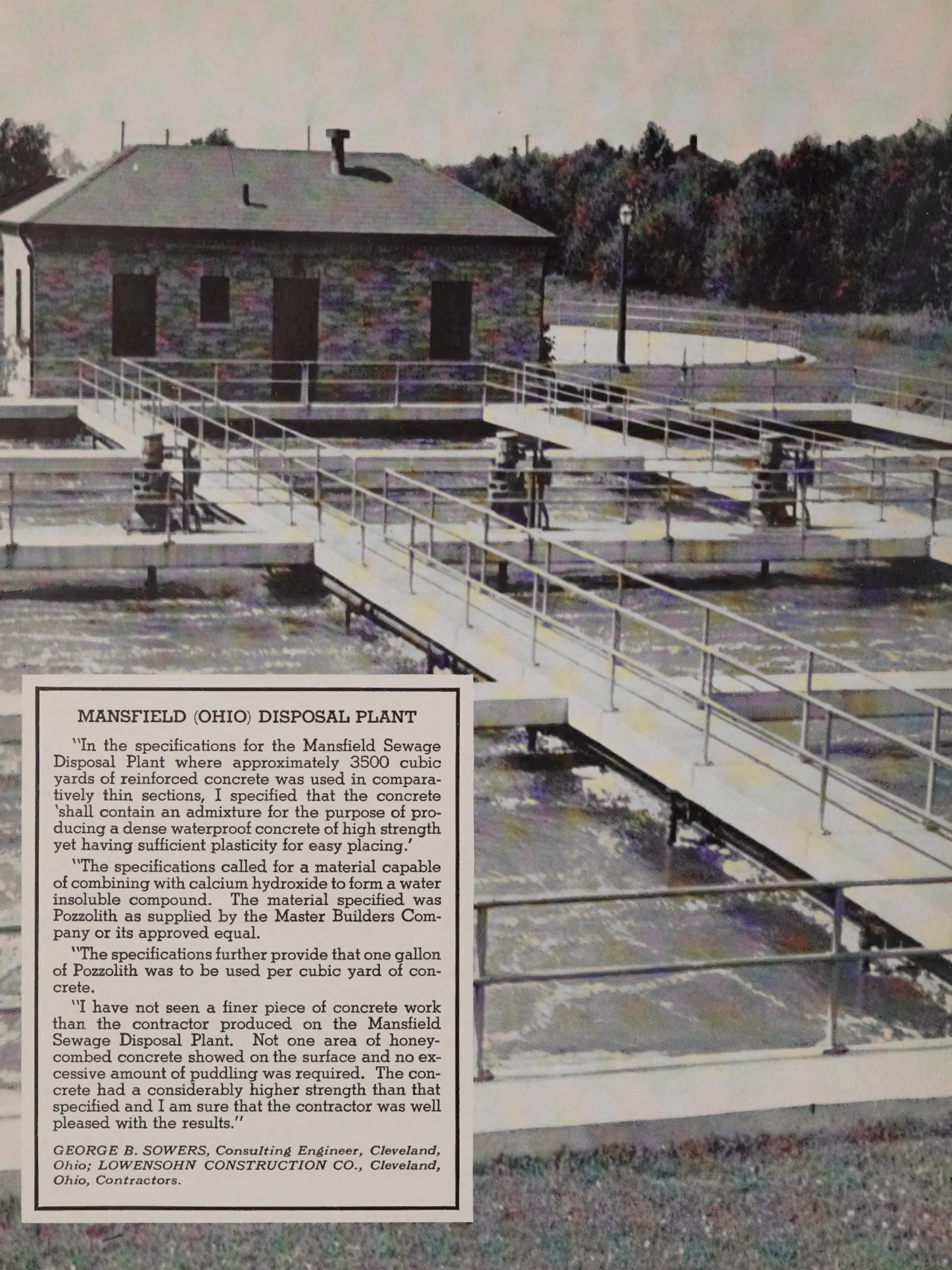
Plain	.036
Pozzolith	**.020**

Shrinkage before hardening reduced 44%

MASTER BUILDERS RESEARCH LABORATORIES

Loring O. Hanson, Registered Engineer, Wisconsin University, testing Pozzolith vs. Plain for volume change using Equal W/C concludes "As the principal difference, concrete mixes with Pozzolith showed an average reduction for nine mixes of 12% in contraction after three cycles of wetting and drying."

It is to be noted that Mr. Hanson's tests were made at equal water-cement ratios and not at equal consistencies.



MANSFIELD (OHIO) DISPOSAL PLANT

"In the specifications for the Mansfield Sewage Disposal Plant where approximately 3500 cubic yards of reinforced concrete was used in comparatively thin sections, I specified that the concrete 'shall contain an admixture for the purpose of producing a dense waterproof concrete of high strength yet having sufficient plasticity for easy placing.'

"The specifications called for a material capable of combining with calcium hydroxide to form a water insoluble compound. The material specified was Pozzolith as supplied by the Master Builders Company or its approved equal.

"The specifications further provide that one gallon of Pozzolith was to be used per cubic yard of concrete.

"I have not seen a finer piece of concrete work than the contractor produced on the Mansfield Sewage Disposal Plant. Not one area of honeycombed concrete showed on the surface and no excessive amount of puddling was required. The concrete had a considerably higher strength than that specified and I am sure that the contractor was well pleased with the results."

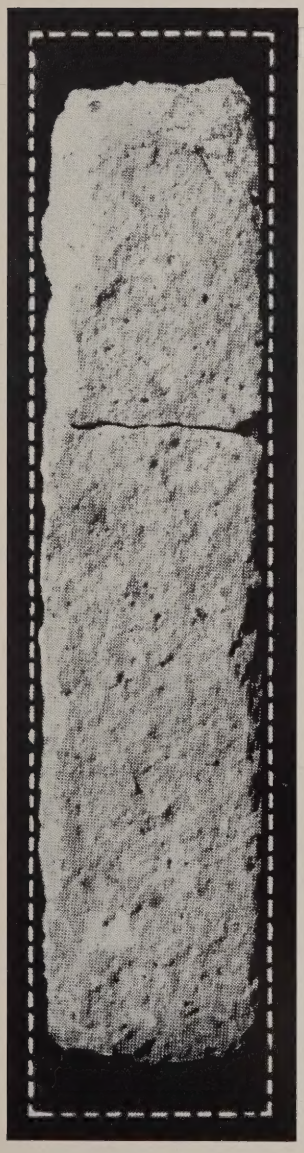
GEORGE B. SOWERS, Consulting Engineer, Cleveland, Ohio; LOWENSOHN CONSTRUCTION CO., Cleveland, Ohio, Contractors.

DURABILITY...

THE RESULT OF POZZOLITH

and LESS WATER!

Freezing and thawing are the enemies of all exposed concrete structures; freezing and thawing tests are regarded as the most adequate index of concrete durability. Pozzolith's ability to lengthen materially the life of concrete is graphically shown below.



Pozzolith

Compare these two unretouched photos of 1-5 mortar specimens after being subjected to 150 cycles of freezing and thawing. The specimens shown are but two of many used in these tests.

Fractures in specimens are results of cross-bending tests made after the freezing and thawing cycles. These tests revealed that Pozzolith-fortified specimens are 75% stronger and lost 40% less in weight.

(From tests made by Loring O. Hanson, Registered Professional Engineer, University of Wisconsin.)

● The results of these tests are the answer to the question of "How long will Pozzolith concrete last?" 150 cycles of freezing and thawing are an accelerated test equivalent to many years of severe exposure.

Plain

ALLENTOWN RESERVOIR

Morris Knowles, Inc., Pittsburgh, Pa., engineers, specified and used Pozzolith in approximately 25,000 cubic yards of concrete to ". . . materially decrease the volume of water required to produce a placeable concrete." M. A. Long Co., Allentown, Pa., were contractors on this project.

POZZOLITH

POZZOLITH is a ferric alumino silicate in liquid suspension, having early-effective pozzolanic properties, resulting in the advantages dealt with in the preceding pages and other benefits more fully described in the succeeding ones.

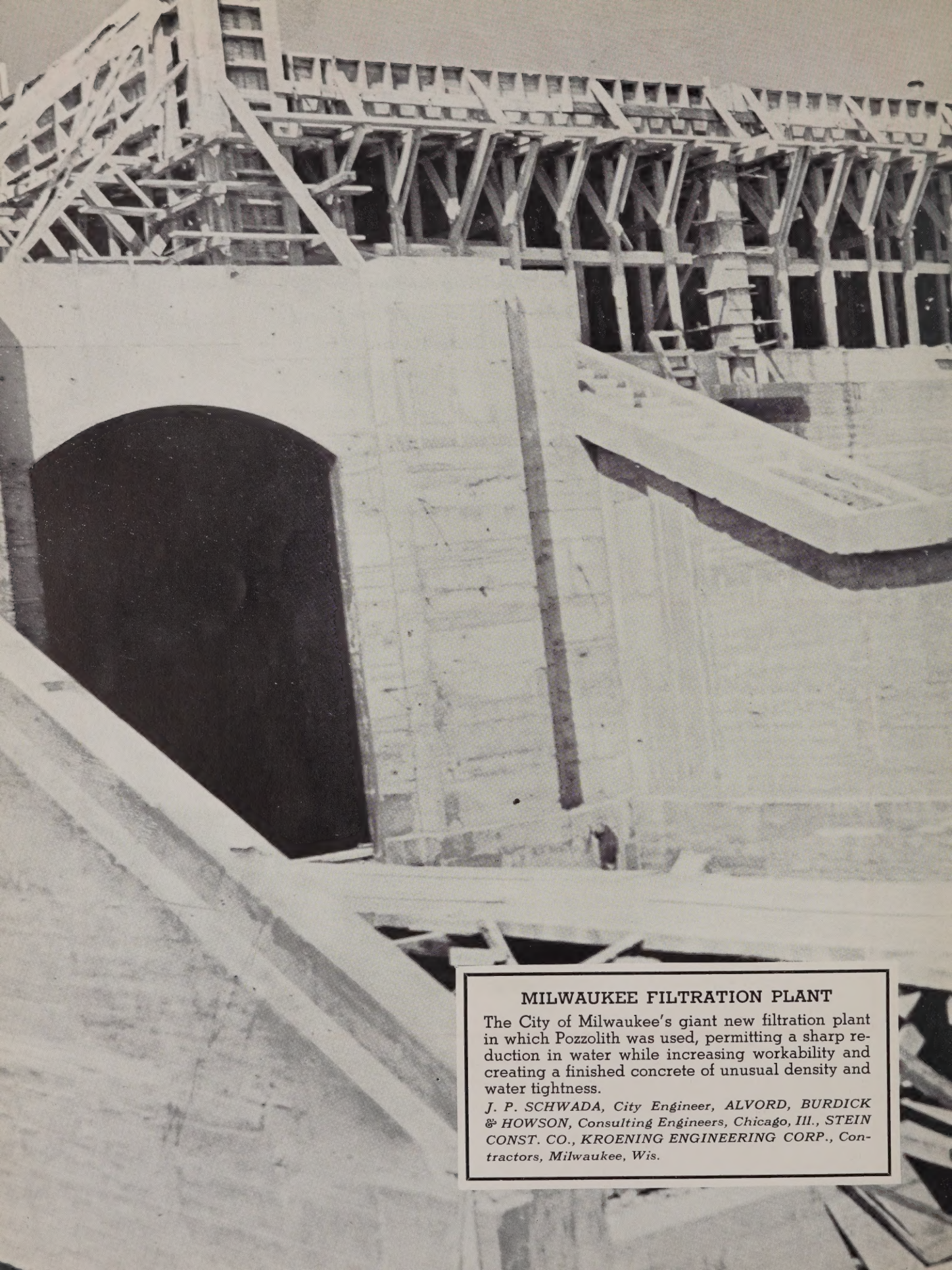
Pozzolith is easy to use. Its action is automatic. Its beneficial effects on concrete are certain.

SPECIFICATION (U.S.A.)

Master Builders Pozzolith shall be added in the proportions of 1 Gal. of Pozzolith per cu. yd. of concrete to all mixes using up to 5½ sacks of cement per cubic yard. For each sack of cement per cubic yard in excess of 5½ sacks, one additional quart of Pozzolith shall be added to the mix. (For example, in 6½ sack mixes use 5 qts. of Pozzolith; in 7 sack mixes use 5½ qts., etc.)
The volume of clear water shall in all cases be reduced by not less than the volume of Pozzolith added to the mix.

SPECIFICATION (Canada)

Master Builders Pozzolith shall be added in the proportions of 1 Gal. of Pozzolith per cu. yd. of concrete to all mixes using up to 6 sacks of cement per cubic yard. For each sack of cement per cubic yard in excess of 6 sacks, one additional quart of Pozzolith shall be added to the mix. (For example, in 7 sack mixes use 5 qts. of Pozzolith; in 7½ sack mixes use 5½ qts., etc.) The volume of clear water shall in all cases be reduced by not less than the volume of Pozzolith added to the mix.



MILWAUKEE FILTRATION PLANT

The City of Milwaukee's giant new filtration plant in which Pozzolith was used, permitting a sharp reduction in water while increasing workability and creating a finished concrete of unusual density and water tightness.

J. P. SCHWADA, City Engineer, ALVORD, BURDICK & HOWSON, Consulting Engineers, Chicago, Ill., STEIN CONST. CO., KROENING ENGINEERING CORP., Contractors, Milwaukee, Wis.

OTHER BENEFICIAL EFFECTS OF POZZOLITH

POZZOLITH imparts to concrete several added benefits of prime importance. It is well known that a material decrease in the volume of water in the mix affords

Greater Density

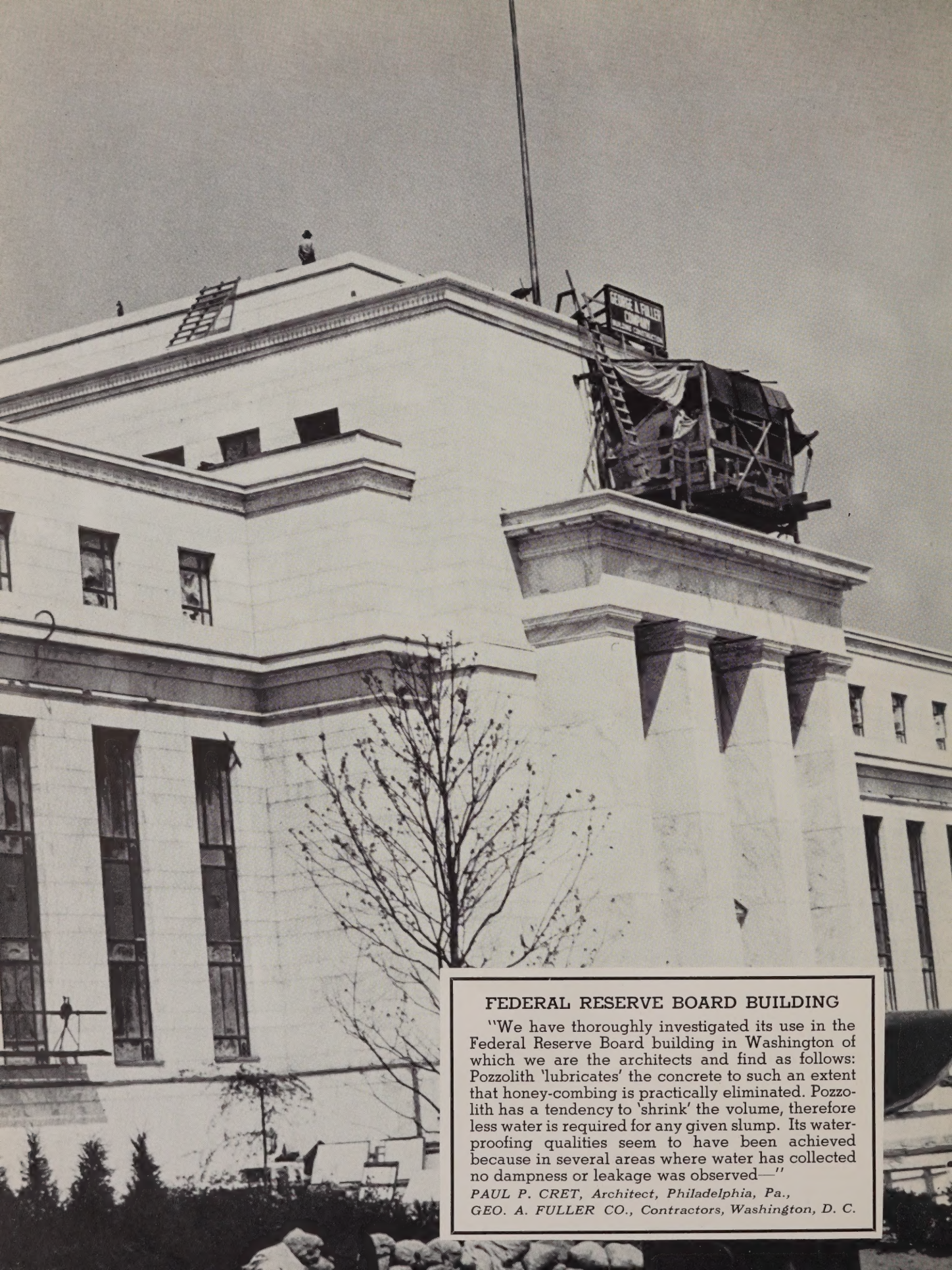
Water-Tightness

Strength

Corrosion Resistance

•

The following pages are devoted to an exposition of these points.



FEDERAL RESERVE BOARD BUILDING

"We have thoroughly investigated its use in the Federal Reserve Board building in Washington of which we are the architects and find as follows: Pozzolith 'lubricates' the concrete to such an extent that honey-combing is practically eliminated. Pozzolith has a tendency to 'shrink' the volume, therefore less water is required for any given slump. Its water-proofing qualities seem to have been achieved because in several areas where water has collected no dampness or leakage was observed—"

PAUL P. CRET, Architect, Philadelphia, Pa.,
GEO. A. FULLER CO., Contractors, Washington, D. C.

LESS WATER—GREATER STRENGTH

The compressive strength of concrete follows closely the water-cement ratio law. The more water, the lower the strength—the less water, the higher the strength. Pozzolith confers greater strength on all concrete mixes at equal consistencies.

CITY OF HARTFORD, CONN.
ENGINEERING LABORATORY

Mix	Water Gals.	Slump Inches	Compressive Strength—Lbs./Sq. In. 7 days	28 Days
Cement 625 lbs. Sand 1450 lbs. Traprock 2125 lbs.	43	2¾	1370	2825
Same mix as above plus POZZOLITH	36	4¼	**2120**	**3720**

OHIO STATE UNIVERSITY
Engineering Experiment Station

Mix	Pounds Cement	Sand	Stone	Water	Slump Inches	Compressive Strength Lbs./Sq. In. 28 Days
1 : 5½—Plain	18.38	38.38	68.50	11.18	1.75	4387
1 : 5½—Pozzolith	18.38	38.38	68.50	10.38	2.25	**5372**

LEY CREEK PROJECT, SYRACUSE, N. Y.

Cement Used	Water	Slump Inches	Breaking Stress—Lbs./Sq. In. 28 Days
6 bags—Plain	26 gals.	4	2990
6 bags—Pozzolith	18 gals.	3	**4300**

LESS WATER—GREATER WATER TIGHTNESS

ABSORPTION TESTS

"The concrete mixes with Pozzolith had an average absorption of 15 to 20 per cent under that of corresponding plain concrete mixes. The 1:2 and 1:3 mortar mixes containing Pozzolith had an average decreased absorption of approximately 20 per cent."

Report of Loring O. Hanson,
Registered Professional Engineer
The University of Wisconsin,
Madison, Wisconsin.

BOARD OF TRANSPORTATION
New York City, N. Y.

Mix—Cement 179 lbs.
Sand 366.6 lbs.
Stone 6 2-3 cu. ft.

	Gals. Water	Slump Inches	Absorbency @ 48 hrs.—%
Plain	10.7	1½-2-⅜-3¼	6.4
Pozzolith	10 plus 1.9 Qts. Pozzolith	1-2-3	5.2

Reduction in Absorption with Pozzolith 19%.

To be water-tight concrete must be extremely dense, of low absorbency, and free from shrinkage cracks. Greater density and lowered absorption result from lower W/C, provided that placeability is not impaired. Pozzolith concrete is more water-tight because a substantial portion of the excess placing water is automatically eliminated, so that there are fewer and smaller cracks through which water can penetrate.

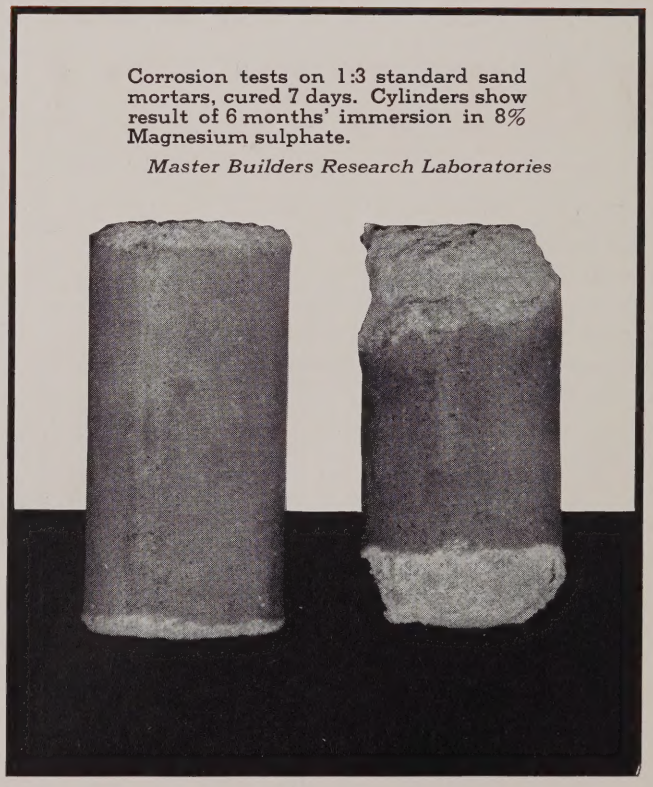
POZZOLANIC ACTIVITY

POZZOLANA is the name given to materials which combine with the free lime in cement to form insoluble cementitious compounds. The value of a pozzolana is in most cases directly proportional to the extent and immediacy of this action. Most pozzolanas require additional placing water—Pozzolith actually requires less. Effective pozzolanas reduce the susceptibility to attack in finished concrete (see illustration below). Pozzolith contains a synthetic pozzolana (an exclusive Master Builders development) assuring consistently uniform results. Of extreme importance is the fact that its pozzolanic action in concrete is **immediately effective.**

CORROSION RESISTANCE VITAL IN MANY JOBS

Many concrete structures are exposed to sea water, alkali soil, corrosive solutions formed from acid impurities in the air, from various soluble compounds in nature or from industrial processes, all high destructive agencies. Even pure water takes its toll after a period of years.

Pozzolith concrete stubbornly resists these disintegrating forces—*see illustration.*



Corrosion tests on 1:3 standard sand mortars, cured 7 days. Cylinders show result of 6 months' immersion in 8% Magnesium sulphate.

Master Builders Research Laboratories

Pozzolith Plain

REPRESENTATIVE POZZOLITH JOBS

Aquatic Park Project
San Francisco, Calif.

Brainerd Field Hangar
Hartford, Conn.

Sewage Treatment Plant
Middletown, Conn.

Florida State Farm Dairy
Raiford, Florida

Superior Copper Prod. Co.
Chicago, Illinois

Wilson & Company
(Meat packing plant)
Chicago, Illinois

Sewage Disposal Plant
Waukegan, Illinois

Southern Indiana Gas & Elec. Co.
(power house)
Ohio River Station
Evansville, Indiana

Biddeford & Saco Water Co.
Biddeford, Maine

Mid City Garage
Easton, Maryland

U. S. Post Office
Easton, Maryland

Water Shops Pond Bridge
Springfield, Mass.

Consumers Power Co.
Elm St. Steam Plant
Battle Creek, Mich.

American Aggregates Corp.
Dearborn, Michigan

St. Gabriels Church &
Sunday School
St. Louis, Missouri

E. I. du Pont de Nemours & Co.
Carney's Point, N. J.

The Bristol Myers Co.
Hillside, N. J.

Pennsylvania Railroad Co.
Newark, N. J.

Westinghouse Electric Co.
Newark, N. J.

Municipal Sewage Disposal Plant
New Brunswick, N. J.

E. I. du Pont de Nemours & Co.
(Reservoir)
Parlin, N. J.

Municipal Power House
Vineland, N. J.

Westwood Sewage Disposal Plant
Westwood, Bergen Co., N. J.

Sewage Treatment Plant
Auburn, N. Y.

Water & Filtration Plant
Brocton, N. Y.

Buffalo Slag Co. Plant No. 2
Lackawanna, N. Y.

Erie Railroad Co.
(William Street Bridge)
Buffalo, N. Y.

Erie Railroad Co. (bridge)
Callicoon, N. Y.

Eaton Grade School
Eaton, N. Y.

Erie Railroad Co. (bridge)
Endicott, N. Y.

High School
Horicon, N. Y.

Central Grade & High School
Marcellus, N. Y.

Morrisville-Eaton High School
Morrisville, N. Y.

Oldbury Electrochemical Co.
Niagara Falls, N. Y.

Olmstedville Central School
Olmstedville, N. Y.

Erie Railroad Grade Elimination
Port Jervis, N. Y.

Prattsburgh High School
Prattsburgh, N. Y.

Reservoir
Rome, N. Y.

St. Anthony of Padua School
Convent
Syracuse, N. Y.

Long Creek Lodge
Elkin, N. C.

Sewage Disposal Plant
Chillicothe, Ohio

Oakwood Country Club
(swimming pool)
Cleveland, Ohio

W. J. Schoenberger Factory
Cleveland, Ohio

Standard Oil Co. Service Station
Cleveland, Ohio

Telling Belle Vernon Co.
Cleveland, Ohio

Y & O Coal Co. (mine)
Martins Ferry, Ohio

Wheeling Steel Corp.
Steubenville & Yorkville, Ohio

Northeastern Teacher's College
Tahlequah, Oklahoma

Sewage Disposal Plant
Beaver Falls, Pa.

The Allegheny Steel Co.
Brackenridge, Pa.

School Stadium
Columbia, Pa.

Anderson Creek Dam
DuBois, Pa.

Committee on Masonic Homes
Apple Storage Bldg. & Tunnel
Elizabethtown, Pa.

McKee Building
Elizabethtown, Pa.

Lehigh Valley Coal Co.
(cinder pit)
Hazleton, Pa.

Borough of Herndon Reservoir
Herndon, Pa.

Trucksville High School
Kingston Twp., Pa.

Lock Haven Court House
Lock Haven, Pa.

Penna. Power & Light Co. Dam
Newville, Penna.

Knouse Corp. Reservoir
Peach Glen, Penna.

Pen Argyl High School
Pen Argyl, Penna.

Phila. Theological Seminary
Tunnel, Overbrook,
Philadelphia, Pa.

The Citizens Water Co.
Washington, Pa.

Lycoming County Home
Williamsport, Pa.

Lycoming County Sewage
Disposal Plant
Williamsport, Pa.

Metropolitan Edison Co. Dam
York Haven, Pa.

Mt. Pleasant Ave. Sr. High School
Providence, R. I.

Chambers County Courthouse
Anahuac, Texas

Ft. Worth Centennial Frontier
Show
Cafe-Theatre
Ft. Worth, Texas

New Hays County Jail
San Marcos, Texas

Va. Public Service Co.
Edinburg, Va.

East End & Bluestone Treatment
Plants
Bluefield, W. Va.

The Viscose Company
Parkersburg, W. Va.

Wheeling Steel Co.
Wheeling, W. Va.

Rainbow Dam of the Wisc. Valley
Implement Co.
Lake Tomahawk, Wisconsin

Imperial Oil Co. Wharf
Halifax, N. S.

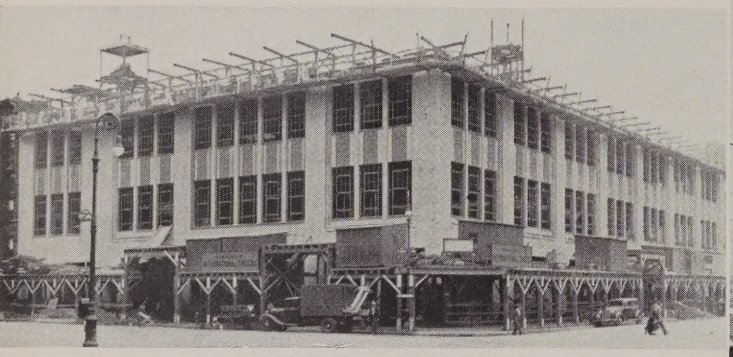
The International Nickel Co. of
Canada Ltd.
Copper Cliff, Ontario

Montreal Tramways Garage
Montreal, Quebec

READ WHAT THESE ENGINEERS

St. Charles Filtration Plant, St. Charles, Mo. J. W. Smelser, City Engineer. Contractors—A. H. Stiel, Inc., St. Louis, Mo. "We are very happy to advise you that Pozzolith was used in the construction of this new $80,000.00 water purification plant for the City of St. Charles, Missouri, and on this job Pozzolith permitted a substantial reduction in water while maintaining full strength and increasing the plasticity and workability of the mix." Russell & Axon—Engineers, St. Louis, Mo.

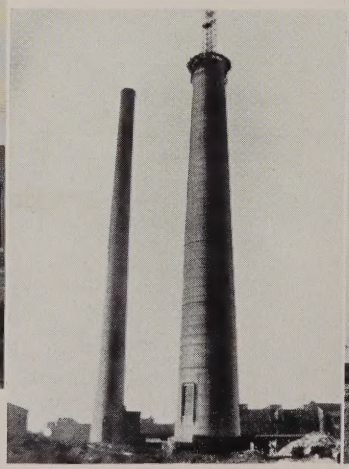
Wilson & Co., Albert Lea, Minnesota. Private Plans Contractor—Robert W. Scott, Albert Lea, Minn.



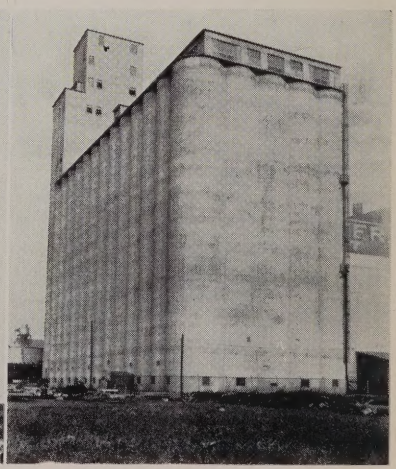
International Motor Truck Co., New York City (F. A. Hussey Bldg.) Architect—Van F. Pruitt, New York City. Contractors—Turner Construction Co., New York City.

St. Louis Dairy Co., St. Louis, Mo. Associate Architects—C. Anderson, N. Y. City and Gerald W. Wolf, St. Louis, Mo. Contractors—Fruin-Colnon Construction Co., St. Louis, Mo.

Chillicothe, Ohio, Sewage Disposal Plant. Burgess & Niple, Engineers, Columbus, Ohio, say—"This will advise you that the material reduction of water which was made possible by the use of Pozzolith enabled our Contractors to build concrete of exceptional density and water tightness for the above project." W. E. Wood Co., Detroit, Michigan, Contractors.

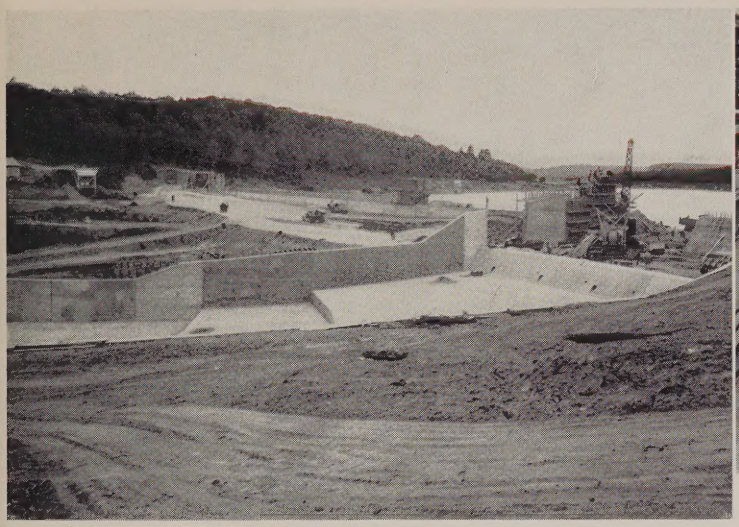


Immense stack built by Custodis Canadian Chimney Company, Ltd., Toronto, Ontario.

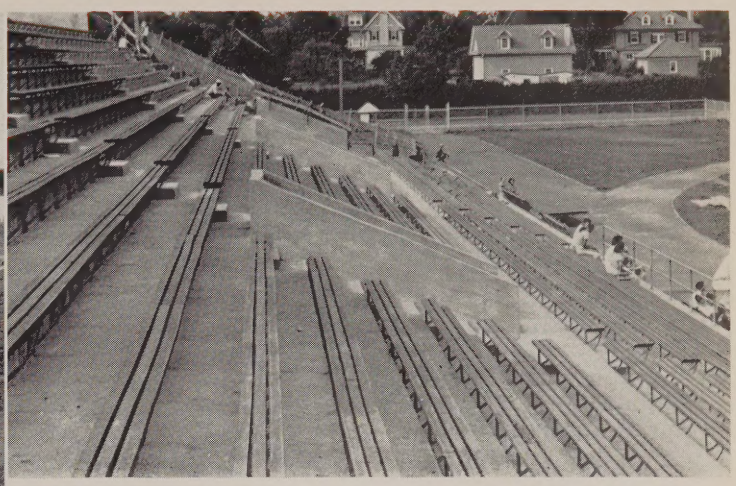


Froedtert Malting Co., Milwaukee, Wisconsin. Engineers—Private Plans. Contractors—Burrell Engineering & Construction Co., Chicago, Ill.

SAY ABOUT POZZOLITH ★

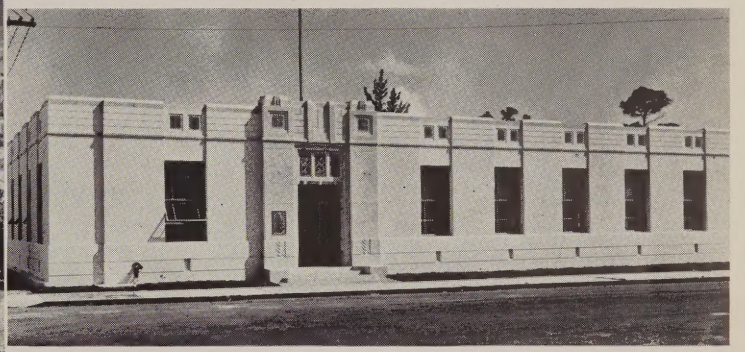


Anderson's Creek Dam, Du Bois, Penna. Engineers—Morris Knowles, Inc., Pittsburgh, Penna. Contractors—Gannett, Eastman & Fleming, Harrisburg, Penna.



★ Collingswood High School Stadium, Collingswood, N. J. Architect F. Herbert Radey, Camden, N. J. says—"With the use of Pozzolith, much less water was needed to obtain excellent workability in the mix on this job."

Sewage Disposal Plant, Auburn, N. Y. Engineer—Thomas F. Bowe, New York City. Contractor—W. E. Bouley, Auburn, N. Y.



Southern Bell Telephone Co. Dial Station, Coral Gables, Fla. Engineers—Robert & Co., Atlanta, Ga. Contractor —Fred Howland, Inc., Miami, Fla.

Erie Railroad Bridge, Buffalo, N. Y. Private Plans. Contractors—Freeman & Jones, Cleveland, Ohio.

★ Michigan State College Stadium, E. Lansing, Mich. Architects—Bowd & Munson, Lansing, Mich. "The new concrete work in the Stadium in which we used Pozzolith seems to be entirely satisfactory. We were able to use a consistency which allowed easy placement and still did not cause 'boils' to occur on the lower steps from the head of fresh concrete above."

L. J. Rothgery, Research Assistant, Engineering Experiment Station, Michigan State College.

THE MASTER BUILDERS CO.

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